Amendments to the Claims

The following listing of the claims will replace all prior versions, and listings of the claims in the application:

Listing of Claims

1-7. (Canceled)

8. (Currently Amended) An optical disc drive for accessing at least three types of optical discs, which are associated with multiple different numerical apertures and multiple different wavelengths, the optical disc drive comprising:

light source means for selectively emitting one of a plurality of light beams with multiple different wavelengths; and

focusing means for focusing a light beam on a data storage layer of a given optical disc at a changeable numerical aperture;

detecting means for detecting light that has been reflected from the given optical disc, on which the light beam was focused by the focusing means;

setting means for setting the numerical aperture of the focusing means equal to a first one of the multiple different numerical apertures, and for setting the wavelength of the light beam equal to a first one of the multiple different wavelengths, the first numerical aperture being smaller than any of the other numerical apertures, the first wavelength being longer than any of the other wavelengths; and

recognizing means for recognizing the type of the given optical disc by a signal representing a reflected and detected portion of the light from the optical disc on which the light beam of the first wavelength was focused at the first numerical aperture that had been selected by the setting means,

~~The optical disc drive of claim 3,~~ wherein the at least three types of optical discs include light beam passage layers with multiple different thicknesses to pass the light beam, and

wherein the optical disc drive further comprises:

spherical aberration correcting means for correcting a spherical aberration produced on the spot of the light beam that has been focused on the data storage layer of the given optical disc; and

spherical aberration regulating means for setting the magnitude of correction to be made by the spherical aberration correcting means equal to a fixed predetermined value when the setting means sets the numerical aperture of the focusing means equal to the first numerical aperture.

9. (Canceled)

10. (Currently Amended) The optical disc drive of claim 8, wherein the multiple different thicknesses include at least one of the ranges of: 1.2+0.3 mm to 1.2-0.1 mm; 0.6+0.53 mm to 0.6-0.5 mm; 100+5 μm to 100-5 μm; and 75+5 μm to 75-5 μm.

11-19. (Canceled)

20. (Currently Amended) An optical disc drive for accessing at least three types of data storage layers, which are associated with multiple different numerical apertures and multiple different wavelengths, the optical disc drive comprising:

focusing means for focusing a light beam on a data storage layer of a given optical disc at a changeable numerical aperture;

detecting means for detecting light that has been reflected from the given data storage layer, on which the light beam was focused by the focusing means;

setting means for setting the numerical aperture of the focusing means equal to a first one of the multiple different numerical apertures, and for setting the wavelength of the light beam equal to a first one of the multiple different wavelengths, the first numerical aperture being smaller than any of the other numerical apertures, the first wavelength being longer than any of the other wavelengths; and

distinguishing means for distinguishing the data storage layer of the given optical disc by a signal representing a reflected and detected portion of the light from the optical disc on which the light beam of the first wavelength was focused at the first numerical aperture that had been selected by the setting means, ~~The optical disc drive of claim 18,~~ wherein the at least three types of data storage layers are located at mutually different depths as measured from a principal surface of the given optical disc, and

wherein the optical disc drive further comprises:

vertical position changing means for moving the focusing means perpendicularly to the data storage layers; and

shifting means for getting the light beam focused on the deepest one of the data storage layers first, the second deepest one next, and so forth toward the surface of the given optical disc, by driving the vertical position changing means while the distinguishing means is distinguishing the given data storage layer.

21. (Currently Amended) The optical disc drive of claim 20, further comprising:

focusing state detecting means for generating a signal representing a focusing state of the light beam on the given data storage ~~layer~~ layers; and

focus control means for getting the light beam focused on one of the at least three types of data storage layers by driving the vertical position changing means in response to the signal generated by the focusing state detecting means,

wherein in accordance with a result obtained by the distinguishing means, the focus control means gets the light beam focused on the one of the at least three types of data storage ~~layer~~ layers earlier than any of the other data storage layers.

22. (Previously Presented) The optical disc drive of claim 21, further comprising:

spherical aberration correcting means for correcting a spherical aberration differently according to the given data storage layer; and

spherical aberration regulating means for adjusting the magnitude of correction to be made by the spherical aberration correcting means according to the one of the at least three types of data storage layers when the focus control means gets the light beam focused on the data storage layer.

23. (Previously Presented) The optical disc drive of claim 20, further comprising:

focusing state detecting means for generating a signal representing a focusing state of the light beam on the given data storage layer of the optical disc;

focus control means for getting the light beam focused on the one of the at least three types of the data storage layers by driving the vertical position changing means in response to the signal generated by the focusing state detecting means; and

storage means for bringing the focusing means closer to, or away from, the optical disc with the numerical apertures of the focusing means switched sequentially and for storing the signal of the focusing state detecting means to be output as the focusing states are changed,

wherein in accordance with the output signal of the focusing state detecting means as stored in the storage means, the focus control means corrects the amplitude and/or balance of the output signal of the focusing state detecting means in getting the light beam focused.

24. (Previously Presented) The optical disc drive of claim 20, further comprising:

focusing state detecting means for generating a signal representing a focusing state of the light beam on the given data storage layer of the optical disc;

focus control means for getting the light beam focused on the one of the at least three types of the data storage layers by driving the vertical position changing means in response to the signal generated by the focusing state detecting means;

storage means for bringing the focusing means closer to, or away from, the optical disc with the numerical apertures of the focusing means switched sequentially and for storing the signal of the focusing state detecting means to be output as the focusing states are changed; and

interlayer jump means for shifting the focal point of the light beam from any of the data storage layers of the optical disc to another in accordance with the output signal of the focusing state detecting means,

wherein in accordance with the output signal of the focusing state detecting means as stored in the storage means, the interlayer jump means corrects the amplitude and/or balance of the output signal of the focusing state detecting means in shifting the focal point from one layer to another.

25. (Previously Presented) An optical disc drive for accessing at least two types of optical discs, which are associated with multiple different numerical apertures, the optical disc drive comprising:

focusing means for focusing a light beam on a data storage layer of a given optical disc at a changeable numerical aperture;

detecting means for detecting light that has been reflected from the given optical disc, on which the light beam was focused by the focusing means;

setting means for setting the numerical aperture of the focusing means equal to a first one of the multiple different numerical apertures, the first numerical aperture being smaller than any of the other numerical apertures;

recognizing means for recognizing the type of the given optical disc by a signal representing a reflected and detected portion of the light from the optical disc on which the light beam was focused at the first numerical aperture that had been selected by the setting means

light source means for selectively emitting one of a plurality of light beams with multiple different wavelengths corresponding to the multiple different numerical apertures;

wavelength selecting means for setting the wavelength of the light beam emitted from the light source means equal to a first one of the multiple different wavelengths when the setting means sets the numerical aperture of the focusing means equal to the first numerical aperture, the first wavelength being longer than any of the other wavelengths,

wherein the focusing means focuses the light beam that has been emitted from the light source means; and

wherein the at least two types of optical discs include light beam passage layers with multiple different thicknesses to pass the light beam, and

wherein the optical disc drive further comprises:

spherical aberration correcting means for correcting a spherical aberration produced on the spot of the light beam that has been focused on the data storage layer of the given optical disc; and

spherical aberration regulating means for setting the magnitude of correction to be made by the spherical aberration correcting means equal to a first correction value when the setting means sets the numerical aperture of the focusing means equal to the first numerical aperture, the first correction value being associated with the largest one of the multiple different thicknesses.

26. (Previously Presented) The optical disc drive of claim 25, wherein the setting means selects one of the multiple different numerical apertures after another in an ascending

order by beginning with the smallest, first numerical aperture, and

wherein the setting means or the wavelength selecting means selects one of the multiple different wavelengths after another in a descending order by beginning with the longest, first wavelength, and

wherein the spherical aberration regulating means selects one of multiple correction values, associated with the multiple different thicknesses, after another in a descending order by beginning with the largest, first correction value, and

wherein the recognizing means determines, by the signal representing the reflected and detected portion of the light from the optical disc on which the light beam was focused at the selected numerical aperture, wavelength and correction value, whether the given optical disc is a type associated with the numerical aperture, wavelength and correction value currently selected.

27. (Previously Presented) The optical disc drive of claim 25, wherein the multiple different thicknesses include at least one of the ranges of: 1.2+0.3 mm to 1.2-0.1 mm; 0.6+0.53 mm to 0.6-0.5 mm; 100+5 μm to 100-5 μm; and 75+5 μm to 75-5 μm.

28. (Previously Presented) An optical disc drive for accessing at least two types of data storage layers, which are associated with multiple different numerical apertures, the optical disc drive comprising:

focusing means for focusing a light beam on a data storage layer of a given optical disc at a changeable numerical aperture;

detecting means for detecting light that has been reflected from the given data storage layer, on which the light beam was focused by the focusing means;

setting means for setting the numerical aperture of the focusing means equal to a first one of the multiple different numerical apertures, the first numerical aperture being smaller than any of the other numerical apertures; and

distinguishing means for distinguishing the data storage layer of the given optical disc by a signal representing a reflected and detected portion of the light from the optical disc on which the light beam was focused at the first numerical aperture that had been selected by the setting means;

wherein the at least two types of data storage layers are located at mutually different depths

as measured from a principal surface of the given optical disc, and

wherein the optical disc drive further comprises:

vertical position changing means for moving the focusing means perpendicularly to the data storage layers; and

shifting means for getting the light beam focused on the deepest one of the data storage layers first, the second deepest one next, and so forth toward the surface of the given optical disc, by driving the vertical position changing means while the distinguishing means is distinguishing the given data storage layer.

29. (Previously Presented) The optical disc drive of claim 28, further comprising:

focusing state detecting means for generating a signal representing a focusing state of the light beam on the given data storage layer; and

focus control means for getting the light beam focused on a desired one of the data storage layers by driving the vertical position changing means in response to the signal generated by the focusing state detecting means,

wherein in accordance with a result obtained by the distinguishing means, the focus control means gets the light beam focused on the desired data storage layer earlier than any of the other data storage layers.

30. (Previously Presented) The optical disc drive of claim 29, further comprising:

spherical aberration correcting means for correcting a spherical aberration differently according to the given data storage layer; and

spherical aberration regulating means for adjusting the magnitude of correction to be made by the spherical aberration correcting means according to the desired data storage layer when the focus control means gets the light beam focused on the desired data storage layer.

31. (Previously Presented) The optical disc drive of claim 28, further comprising:

focusing state detecting means for generating a signal representing a focusing state of the light beam on the given data storage layer of the optical disc;

focus control means for getting the light beam focused on a desired one of the data storage layers by driving the vertical position changing means in response to the signal generated by the focusing state detecting means; and

storage means for bringing the focusing means closer to, or away from, the optical disc with the numerical apertures of the focusing means switched sequentially and for storing the signal of the focusing state detecting means to be output as the focusing states are changed,

wherein in accordance with the output signal of the focusing state detecting means as stored in the storage means, the focus control means corrects the amplitude and/or balance of the output signal of the focusing state detecting means in getting the light beam focused.

32. (Previously Presented) The optical disc drive of claim 28, further comprising:

focusing state detecting means for generating a signal representing a focusing state of the light beam on the given data storage layer of the optical disc;

focus control means for getting the light beam focused on a desired one of the data storage layers by driving the vertical position changing means in response to the signal generated by the focusing state detecting means;

storage means for bringing the focusing means closer to, or away from, the optical disc with the numerical apertures of the focusing means switched sequentially and for storing the signal of the focusing state detecting means to be output as the focusing states are changed; and

interlayer jump means for shifting the focal point of the light beam from any of the data storage layers of the optical disc to another in accordance with the output signal of the focusing state detecting means,

wherein in accordance with the output signal of the focusing state detecting means as stored in the storage means, the interlayer jump means corrects the amplitude and/or balance of the output signal of the focusing state detecting means in shifting the focal point from one layer to another.